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TYPE MATERIAL OF FOUR AFRICAN SPECIES OF *NOTARCHA* MEYRICK, WITH DESIGNATIONS OF LECTOTYPES AND CHANGES IN SYNONYMY (LEPIDOPTERA: CRAMBIDAE: PYRAUSTINAE)

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Abstract.—Lectotypes are designated for three Zeller species: *Notarcha quaternalis, N. temeratalis,* and *N. muscerdalis.* These and the holotype of *N. cassusalis* Walker, the type of *Notarcha,* are redescribed and the wings, head profiles, and female genitalia illustrated.

Key Words: *Notarcha quaternalis, N. temeratalis, N. cassusalis, N. muscerdalis,* lectotypes, African Pyraustinae

In his revision of the Pyralidae Hampson (1898: 728) synonymized seven names under *Lygropia quaternalis* (Zeller). In researching our paper (in prep.) on the Crambidae of Aldabra Atoll, we found it necessary to reexamine this synonymy to determine the identity of an Aldabran species erroneously identified in the literature as *quaternalis.* On examining type specimens we discovered that most, perhaps all, of these seven names represent distinct species. The Aldabra species matches none of them and will be described as new.

The purpose of this paper primarily is to designate lectotypes for *quaternalis* and two related African species to provide stability for the names, and secondarily to redescribe and illustrate the three lectotypes and the holotype of an additional species to separate previously confused forms and to facilitate identification.

The African species that Hampson synonymized under *quaternalis* are *temeratalis* Zeller, and *cassusalis* Walker. All three species are properly referred to *Notarcha* Meyrick, 1884, for which *cassusalis* is the type species. In this paper we include the related *N. muscerdalis,* not part of Hampson's synonymy, but of which we studied Zeller's type. *Notarcha* is a large genus with many undescribed species and deserving of extensive study. The scope of this paper is limited to delineating described African species.

Type material referred to herein is in the collections of the British Museum (Natural History) [BMNH], and the Naturhistoriska riksmuseet, Stockholm [NHRM].

KEY TO INCLUDED SPECIES OF *NOTARCHA*

1. Forewing uniformly yellow, with single dark discal spot (Fig. 4) . . . . . *muscerdalis*
– Forewing yellow with transverse lines or diffuse bands of darker yellow; with dark discal spot and 3 similar spots along costal margin . . . 2
2. Labial palpus with third segment mostly dark brown and first segment with brown medial spot (Fig. 5, arrows) . . . . . *quaternalis*
– Labial palpus without dark markings . . . 3
3. Forewing with anterior half of transverse posterior band in form of diagonal line (Fig. 3) . . . . . *temeratalis*
– Forewing with broad diffuse bands, no lines (Fig. 2) . . . . . *cassusalis*

Notarcha quaternalis **(Zeller)**
Figs. 1, 5, 9, 13–16

Botys quaternalis Zeller, 1852, pp. 44–45.

Diagnosis.—Among the described African species of the *Notarcha quaternalis* complex the dark spot on the basal segment of the labial palpus and the dark third segment (Fig. 5, arrows) are each unique to this species, as is the spiny knob near the entrance to the corpus bursae.

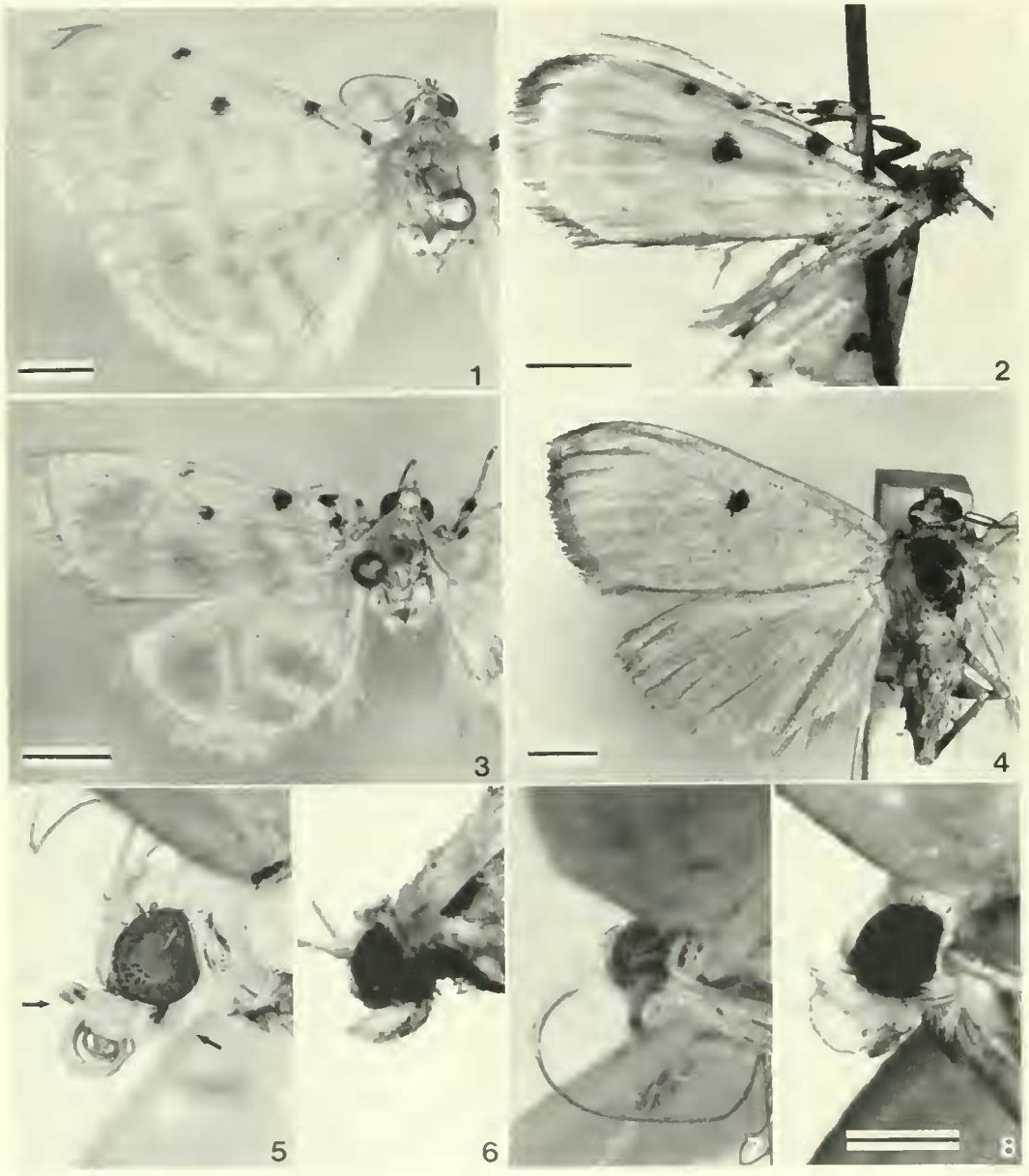
Description (female).—Frons smooth, covered with appressed yellow scales. Labial palpus obliquely ascending; first segment yellow with prominent dark brown medial spot adjacent to eye; second segment yellow; third segment short, subcylindrical, dark brown with yellow apex. Maxillary palpus slender, cylindrical, yellow with subapical dark-brown band. Proboscis scales yellow. Antenna filiform, finely ciliate and with single long cilium near base of each segment; scales light yellow. Eye diameter about 0.75 mm, black. Ocellus prominent, with clear lens surmounted on black elliptical base. Vertex yellow. Occiput and tuft of scales just posterior to ocellus straw colored. Patagium, tegula, and thorax yellow. Forecoxa brownish yellow; forefemur brownish yellow, yellow approaching apex, dark brown at apex; foretibia yellow, dark brown at apex; foretarsus yellow, black markings on basal half and on distal third. [Meso- and metathoracic legs lost on type.]

Forewing (Fig. 1) radius 11 mm; with four subequal dark brown spots; first (most basal) spot elliptical, on costa near wing base and separated from it by its own width; second spot elliptical, on costa at one-fifth distance to wing apex; third (discal) spot nearly circular, very slightly larger than first two, on closing vein of cell; fourth spot slightly smaller and more narrowly elliptical than others, very near to costal margin of wing, but separated from margin by about one-third its length. Ground yellow, marked with diffuse transverse lines of darker yellow; three short lines on basal half of forewing, the first descending from the first spot and separated from wing base by its own width; the second from between the first and second spots; the third from just distal to second spot; a fourth line (transverse posterior) descending from fourth spot to just beyond center of wing, angling sharply basad to just beyond posterior outer angle of cell, then angling sharply posteriorly to posterior wing margin; a sixth runs very near to outer margin of wing, broad near wing apex, narrowing posteriorly, and absent from posterior third of wing.

Hindwing with first line indistinct, descending from second of forewing; second line better developed and descending from third of forewing; third line not matched with any forewing line, descending from lower outer angle of cell; fourth line descending from fourth of forewing, somewhat sinuate, its two most distal portions between M_2 and M_3 and on 1st A; fifth line relatively broad, narrowing posteiorly and approaching posterior end of fourth line; outer margin of wing with distinct dark yellow terminal line; fringe light yellow, darker on basal half.

Lines developed on undersides of both sets of wings; discal spot prominent on underside of forewing, other spots not developed on undersides.

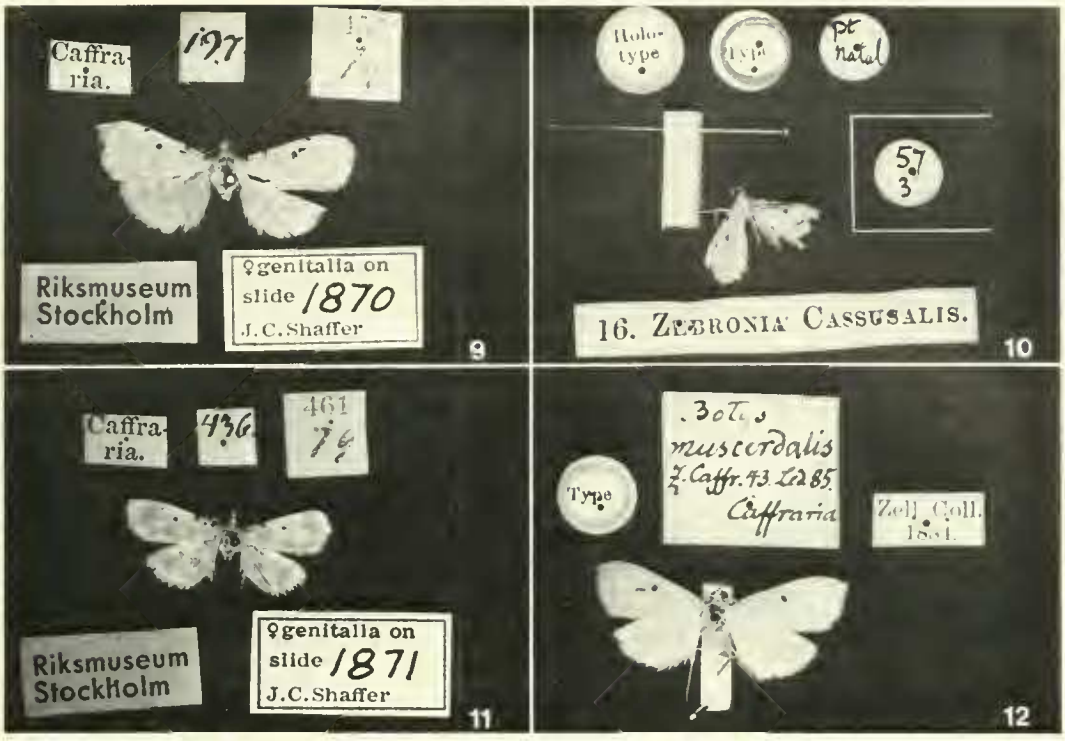
Female genitalia (Figs. 13–16) with ovipositor compressed, with one zone of setae along its inner margin (seen extended in Figs. 13, 14), and a second zone along its outer margin; setae of outer margin densely set and three to four times as long as setae of inner margin. Anterior apophysis nearly twice as long as posterior. Ostial chamber small; immediately adjacent to a flat sclerotized trough; posterior part of inner surface of trough studded with numerous minute, sharp, posteriorly directed spines; anterior part spineless, somewhat granular in appearance. Ductus bursae membranous, with round expanded pouch, studded with numerous minute cusps. Corpus bursae slightly over twice as long as wide; nearly uni-



Figs. 1–4. Wing patterns. 1, *Notarcha quaternalis*, lectotype; 2, *N. cassusalis*, holotype; 3, *N. temeratalis*, lectotype; 4, *N. muscerdalis*, lectotype. Scale bar = 2 mm.

Figs. 5–8. Head profiles of above specimens. 5, *N. quaternalis*; 6, *N. cassusalis*; 7, *N. temeratalis*; 8, *N. muscerdalis*. Scale bar = 1 mm (Figs. 5–8).

formly finely scobinate, each scobination set in center of irregular plate, many plates hexagonal or nearly so; posterior part of bursa with irregular sclerite, spinose on both sides, its posterior end folded into a short knob-shaped pouch with spines facing outward, these spines numerous, slender, sharp pointed; signum absent. Ductus seminalis



Figs. 9–12. Types with labels. 9, *Notarcha quaternalis*, lectotype (1.6×); 10, *N. cassusalis*, holotype, insert shows reverse side of "Pt Natal" label (1.4×); 11, *N. temeratalis*, lectotype (1.6×); 12, *N. muscerdalis*, lectotype (1.4×).

from membranous posterior part of corpus bursae.

Type locality.—Natal, South Africa.

Lectotype, hereby designated, labelled: "Caffraria."; "197"; "Riksmuseum Stockholm"; "♀ genitalia on slide 1870 J. C. Shaffer"; "*Botys quaternalis* Lectotype by J. Shaffer & E. Munroe, 1989" [NHRM].

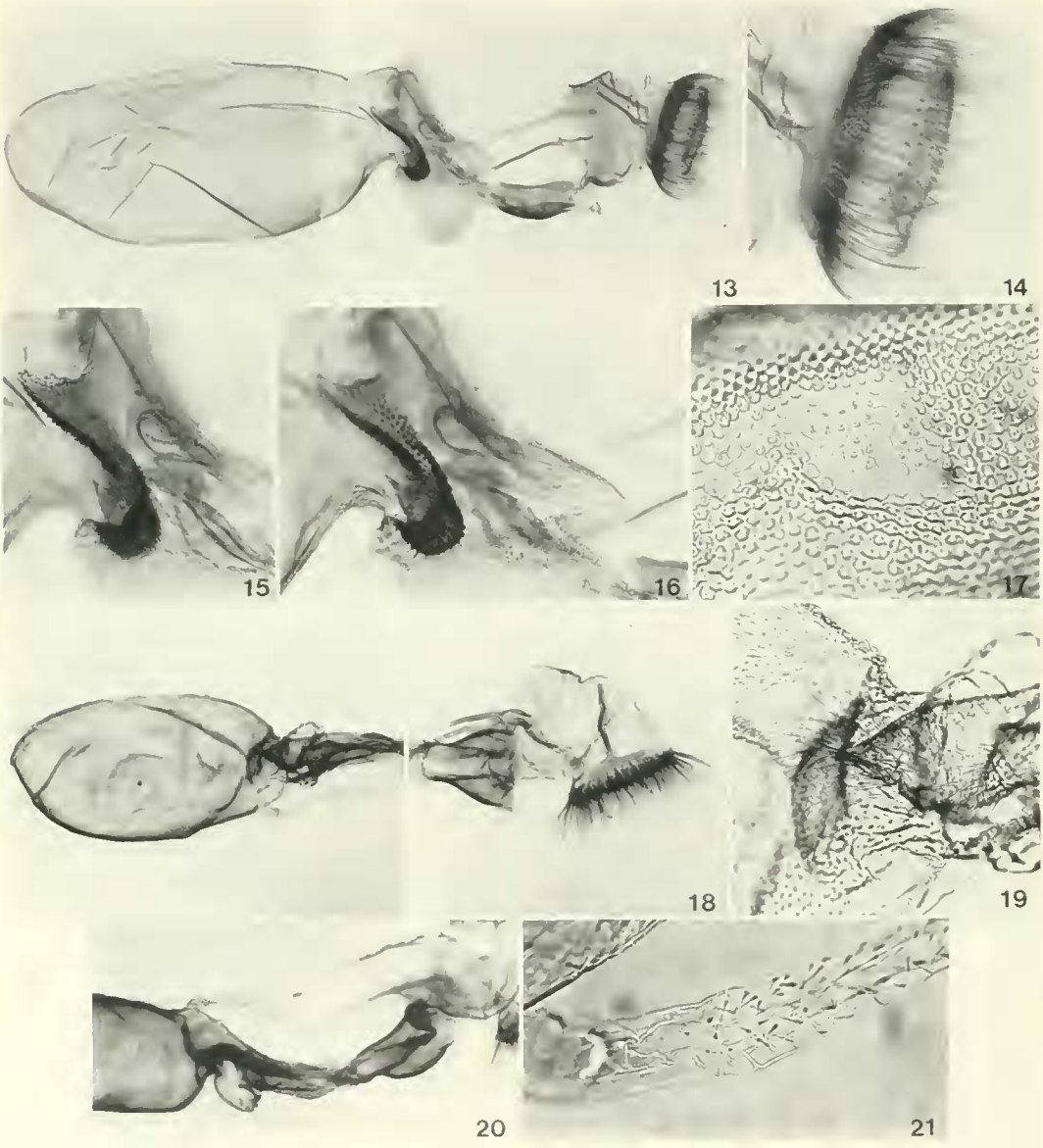
Notarcha cassusalis (Walker)
Figs. 2, 6, 10, 17–21

Zebronia cassusalis Walker, 1859, p. 477.

Diagnosis.—Among the described African species of the *Notarcha quaternalis* complex this species is externally similar to *quaternalis*, but lacks dark markings on the labial palpus, and has broader more diffuse transverse bands on the wings. The spinose triangular plate at the entrance to the corpus bursae and the internally spinose ductus seminalis are each characteristic of this species.

Description (female).—Frons smooth, covered with appressed yellow scales. Labial palpus obliquely ascending, third segment short, subcylindrical; all segments uniformly yellow on outer side, lacking dark spots of *quaternalis*. Maxillary palpus light yellow. Antenna as in *quaternalis*. Eye diameter about 0.5 mm. Ocellus as in *quaternalis*. Vertex yellow; patagium vivid yellow centrally, lighter peripherally; tegula extending nearly to abdomen, vivid yellow.

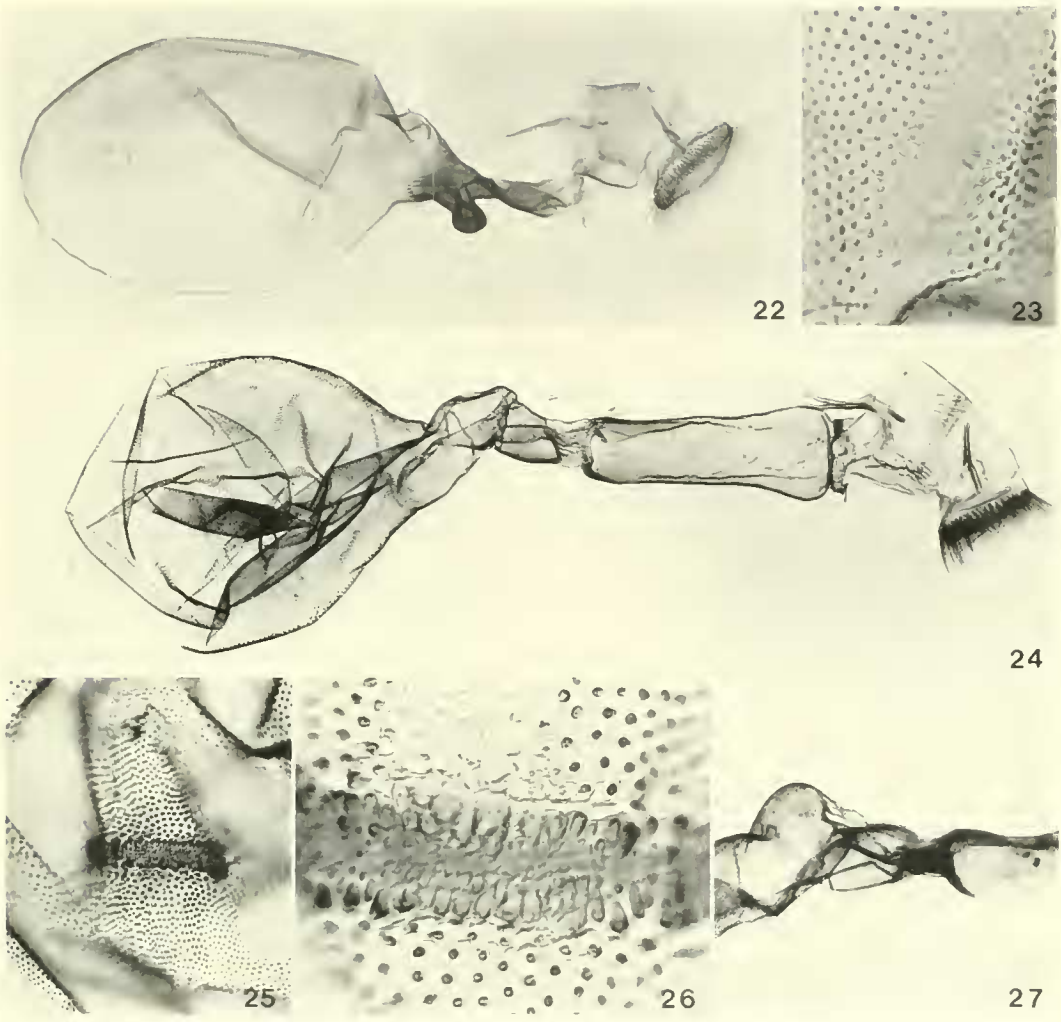
Outer side of forecoxa yellow basally, brown elsewhere; forefemur brown on inner side, light yellow on outer side, small dark brown spot on apex; foretibia yellow on basal half, dark brown on distal half; foretarsus



Figs. 13–21. Female genitalia. 13, *Notarcha quaternalis,* lectotype (20×); 14, ovipositor, enlarged (45×); 15–16, armature at entrance to corpus bursae, two focal levels (50×); 17, *N. cassusalis,* corpus bursae surface, enlarged to show surface texture (220×); 18, female genitalia (28×); 19, armature at entrance to corpus bursae (110×); 20, rotated specimen showing origin of ductus seminalis (28×); 21, ductus seminalis, enlarged to show internal spines (220×).

yellow, brown spot at apex of first segment, smaller spot at apex of second segment, third segment yellow, fourth segment brown, fifth segment yellow. Midfemur rather uniformly light yellow, small dark brown spot at apex; midtibia nearly uniformly light yellow, lacking dark markings; midtarsus light brownish yellow. Metathoracic leg coloration similar to that of mesothoracic leg.

Forewing (Fig. 2) radius about 9 mm.



Figs. 22–27. Female genitalia. 22, *Notarcha temeratalis,* lectotype (28×); 23, corpus bursae surface, enlarged to show surface texture (200×). 24, *Notarcha muscerdalis,* lectotype (23×); 25, signum, enlarged (55×); 26, signum and adjacent bursa surface, enlarged (220×); 27, rotated specimen showing origin of ductus seminalis (28×).

Ground light yellow with broad diffuse vivid yellow bands. Costa with three prominent dark brown spots; spot at basal band reniform, spot on antemedial band the largest of the three, circular, distal spot just beyond midregion of wing and smallest of the three spots. Discal spot dark brown, large and prominent, somewhat triangular with longest side transverse and distal.

Hindwing light yellow with broad diffuse vivid yellow bands.

Female genitalia with ovipositor compressed, moderately setose. Anterior apophysis 1.5 times as long as posterior, slightly decurved; posterior apophysis slender, angled at anterior third and at posterior third. Ostial chamber well sclerotized, broadly expanded posteriorly; anterior one-fifth devoid of spines and somewhat granular in appearance; posterior four-fifths with numerous minute, hairlike spines, these directed inward or posteriorly and shortest

along lateral regions of ostial chamber. Ductus bursae membranous on posterior one-fourth; anterior three-fourths with irregular sheetlike sclerotization, this folded longitudinally about one and one-half times, the nearly closed fold with patch of strong inwardly directed spines near its anterior end; other side of sclerotized sheet extending into corpus bursae as strongly setose triangular plate (Fig. 19); anterior part of ductus bursae with small membranous pouch. Corpus bursae nearly twice as long as broad, lacking signum, nearly uniformly finely scobinate (Fig. 17), each scobination set in center of minute plate, plate hexagonal or approximately so. Ductus seminalis from near posterior end of corpus bursae (Fig. 20), membranous, its inner surface set with numerous slender setae (Fig. 21).

Type locality.—Natal, South Africa.

Holotype, labelled: "Holotype"; "Type"; "Pt Natal [& on reverse side] 57 3"; "Zebronia Cassusalis"; "♀ Pyralidae Brit. Mus. Slide No. 18060" [BMNH].

Notarcha temeratalis (Zeller)
NEW COMBINATION
Figs. 3, 7, 11, 22–23

Botys temeratalis Zeller, 1852, pp. 45–46.

Diagnosis.—Among the described African species of *Notarcha* only *temeratalis* has a portion (anterior half) of the transverse posterior line of the forewing developed as a narrow diagonal line. The species is also unique in that the corpus bursae is unmodified.

Description (female).—Frons smooth, covered with appressed yellow scales. Labial palpus obliquely ascending, third segment short, subcylindrical; all segments white to straw yellow on outer sides, first with indistinct light-brown medial spot adjacent to eye, first and second somewhat darker apically. Maxillary palpus cylindrical, straw yellow. Base of proboscis clothed with straw-yellow scales. Antenna as described for *N. quaternalis*. Eye diameter 0.6 mm, black. Ocellus as described for *N. quaternalis*. Occiput white; patagium yellow anteriorly, white posteriorly; tegula white with yellow medial band. Thoracic vesture of broad white scales beneath head. Forecoxa light brown on inner side, white on outer side; forefemur similar, but with dark-brown apical spot; foretibia yellow basally, distally with tuft of dark-brown scales; foretarsus with dark-brown subapical spot. Midthoracic leg rather uniformly straw yellow, with small dark-brown spot at apex of femur.

Forewing (Fig. 3) radius 9 mm. Ground white, bearing four subequal dark-brown spots; first (most basal) spot nearly round, on costa near wing base and separated from it by its own width, second spot slightly larger, nearly round, somewhat pointed posteriorly, on costa at one-fourth distance to wing apex; third (discal) spot slightly smaller than first two, nearly circular, at outer margin of cell; fourth spot less well developed than other three, in form of oblique dash near costa, not quite reaching wing margin. Ground white with yellow markings in form of line, diffuse bands, and broader diffuse patches; a broad band descending obliquely from second spot to posterior wing margin near base; a second parallel band descending from point midway between second and third (discal) spots to posterior margin, gradually broadening posteriorly; a small yellow patch immediately distal to discal spot; a narrow line descending obliquely distad from fourth spot to 1st A, angled basad between Cu_1 and Cu_2, then obliquely and basad to posterior margin as broad diffuse band; a broad yellow patch in anterior preterminal area, bordered entirely by white ground; a smaller patch from angle of narrow line to terminus; a well developed thin terminal line of yellow on outer margin of wing.

Hindwing ground white; a diffuse yellow band running basally from cubitus in cell, then angled posteriorly to anal margin; a broad yellow band runs obliquely from pos-

terior outer angle of cell to posterior wing margin; a narrow yellow line descending obliquely from fork of Sc and Rs to Cu1, there broadening to an oval yellow patch just anterior to anal angle, oval patch separated from wing margin by narrow white ground; a large yellow patch near apex bordered entirely by white ground; outer margin with a distinct narrow yellow terminal line, and a similar line on fringe near its base, best developed on posterior half of outer margin.

Undersides of both wings with lines and patches showing, but indistinctly so; discal spot poorly developed, other three spots absent.

Female genitalia (Figs. 22, 23) with ovipositor compressed. Anterior apophysis about 1.7 times as long as posterior. Ostial chamber moderately well sclerotized, somewhat flattened, with margins turned dorsad and rolled inward, posterior half with numerous, sharp, posteriorly directed spines. Ductus bursae short, membranous, with small lateral pouch, expanded toward corpus bursae, bearing fine granulations, distinct spines absent. Corpus bursae about 1.5 times as long as wide; signum absent; surface finely scobinate (Fig. 23), each minute scobination borne on an irregular somewhat hexagonal plate; scobinations best developed on dorsal surface. Ductus seminalis arising dorsally from junction of corpus bursae and ductus bursae.

Type locality.—South Africa, roughly the region of the Transvaal and Orange Free State. Zeller (p. 46) cites the type locality as: "Patria ad fluvios Limpoponem et Gariepem." Gariep (Gareep) is an obsolete name which according to Skead (1973: 61, 171, 239) applied to both the lower and upper (above its junction with the Vaal) Orange River and to the lower Vaal River. Zeller's material came from Wahlberg, whose collecting localities in South Africa are imprecisely known. Horn and Kahle (1936: 293) record Wahlberg's first journey (1838–1845) there as to southern Africa, only later (1853) traveling to southwestern Africa. Therefore, it is probable that Zeller's reference to the Gariep applies to the upper (eastern) Orange or possibly to the lower Vaal, but not to the lower (western) Orange.

Lectotype, hereby designated, labelled: "Caffraria."; "436"; "Riksmuseum Stockholm"; "♀ genitalia on slide 1871 J. C. Shaffer"; "*Botys temeratalis* Lectotype by J. Shaffer & E. Munroe, 1989" [NHRM].

Notarcha muscerdalis (Zeller)
NEW COMBINATION
Figs. 4, 8, 12, 24–27

Botys muscerdalis Zeller, 1852, pp. 43–44.

Diagnosis.—This species is distinguished externally from other African species of *Notarcha* by having a dark discal spot on an otherwise uniformly yellow forewing and internally by the presence of a signum on the corpus bursae.

Description (female).—Frons smooth, covered with appressed yellow scales. Labial palpus obliquely ascending, third segment short, subcylindrical; second and third segments uniformly yellow on outer sides, first segment similar distally, lighter basally; all segments devoid of dark spots. Maxillary palpus cylindrical, slender, extending to base of third segment of labial palpus; yellow. Antenna as in *N. quaternalis*. Ocellus well developed, with clear round lens on black elliptical base. Vertex yellow; occiput light yellow; patagium and tegula vivid yellow.

Forewing (Fig. 4) radius 12 mm; ground nearly uniformly yellow with a single large dark-brown elliptical, obliquely set discal spot.

Hindwing uniformly yellow.

Forecoxa brownish yellow; forefemur brown on inner side, light yellow on outer side; foretibia brownish yellow on basal half, brown on distal half; foretarsus with first segment yellow, second similar but with suggestion of brown at apex, third yellow on basal half, brown on distal half, fourth

and fifth brown. Meso- and metathoracic legs nearly uniformly yellow.

Female genitalia (Figs. 24–27) with ovipositor compressed; lobes narrow, moderately setose. Anterior apophysis about 1.4 times as long as posterior, curved upward slightly, foliate at base; posterior apophysis with distal two-thirds straight. Ostial chamber well sclerotized, long and narrow, four times as long as central width, expanded slightly at posterior end; smooth, devoid of spines or setae. Ductus bursae with posterior one-third membranous, unarmed but for exceedingly minute widely spaced cusps; anterior two-thirds sclerotized, set with numerous minute cusps. Corpus bursae nearly round, slightly longer than wide, posterior end tapering to ductus bursae; surface finely scobinate (Fig. 25), each scobination in center of minute plate, roughly hexagonal to foliate; a single small longitudinal signum (Fig. 25) in center of corpus bursae, formed of several irregular longitudinal rows of small sclerotized papillae (Fig. 26). Ductus seminalis (Fig. 27) from extreme posterior end of corpus bursae, inner surface set with widely separated minute triangular cusps, devoid of setae.

Type locality.—South Africa, roughly the region of the Transvaal and Orange Free State. (Comment under *temeratalis* above applies here also.)

Lectotype, hereby designated, labelled: "Type"; "Botys muscerdalis Z. Caffr. 43. Led 85. Caffraria"; "Zell. Coll. 1884"; "♀ Pyralidae Brit. Mus. Slide No. 18061"; "*Botys muscerdalis* Lectotype by J. Shaffer & E. Munroe, 1989" [BMNH].

Acknowledgments

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